

BEST AVAILABLE COPY

Application No.: 10/664,671

Docket No.: JCLA12230

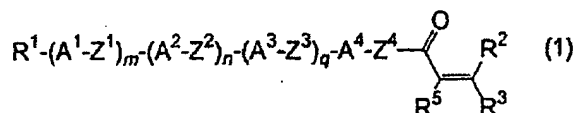
AMENDMENTSRECEIVED
CENTRAL FAX CENTER

MAR 27 2007

In The Claims:

Please amend the claims as follows:

1. (currently amended) A compound of formula (1):



wherein R^1 represents ~~hydrogen~~, halogen, $-\text{CN}$, $-\text{CF}_3$, $-\text{CF}_2\text{H}$, $-\text{CFH}_2$, $-\text{OCF}_3$, $-\text{OCF}_2\text{H}$, $-\text{N}=\text{C}=\text{O}$, $-\text{N}=\text{C}=\text{S}$, or alkyl having from 1 to 20 carbon atoms, and any $-\text{CH}_2-$ of the alkyl may be substituted with $-\text{O}-$, $-\text{S}-$, $-\text{CO}-$, $-\text{COO}-$, $-\text{OCO}-$, $-\text{CH}=\text{CH}-$, $-\text{CF}=\text{CF}-$ or $-\text{C}\equiv\text{C}-$, and any hydrogen thereof may be substituted with halogen or $-\text{CN}$; R^2 , R^3 and R^5 each independently represent hydrogen or alkyl having from 1 to 3 carbon atoms; A^1 , A^2 , A^3 and A^4 each independently represent 1,4-cyclohexylene, 1,4-cyclohexenylene, 1,4-phenylene, naphthalene-2,6-diyl, tetrahydronaphthalene-2,6-diyl, fluorene-2,7-diyl, bicyclo[2.2.2]octane-1,4-diyl or bicyclo[3.1.0]hexane-3,6-diyl, and in these rings, any $-\text{CH}_2-$ may be substituted with $-\text{O}-$, and any $-\text{CH}=\text{CH}-$ may be substituted with $-\text{N}=\text{N}-$, and in these rings, any hydrogen may be substituted with halogen or alkyl having from 1 to 5 carbon atoms; Z^1 , Z^2 and Z^3 each independently represent a single bond, $-(\text{CH}_2)_a-$, $-\text{O}(\text{CH}_2)_a-$, $-(\text{CH}_2)_a\text{O}-$, $-\text{O}(\text{CH}_2)_a\text{O}-$, $-\text{CH}=\text{CH}-$, $-\text{C}\equiv\text{C}-$, $-\text{COO}-$, $-\text{OCO}-$, $-(\text{CF}_2)_2-$, $-\text{C}\equiv\text{C}-\text{COO}-$, $-\text{OCO}-\text{C}\equiv\text{C}-$, $-\text{CH}=\text{CH}-(\text{CH}_2)_2-$, $-(\text{CH}_2)_2-\text{CH}=\text{CH}-$, $-\text{CF}=\text{CF}-$, $-\text{C}\equiv\text{C}-\text{HC}=\text{CH}-$, or $-\text{CH}=\text{CH}-\text{C}\equiv\text{C}-$, ~~$-\text{OCF}_2-$, or $-\text{CF}_2\text{O}-$~~ , and a indicates an integer of from 1 to 20; Z^4 represents a single bond or α,ω -alkylene having from 1 to 4 carbon atoms, and when Z^4

Application No.: 10/664,671

Docket No.: JCLA12230

represents α,ω -alkylene having 3 or 4 carbon atoms, the $-\text{CH}_2-$ thereof directly bonded with A^4 may be substituted with $-\text{O}-$, $-\text{S}-$, $-\text{COO}-$ or $-\text{OCO}-$; m, n and q each independently indicates 0, 1 or 2, but $m+n+q \geq 1$;

wherein when $m+n+q=1$, any $-\text{CH}_2-$ of the alkyl represented by R^1 is not substituted with $-\text{CO}-$ and Z^4 is a single bond; and

wherein when $m+n+q=1$, Z^4 is a single bond and A^4 represents 1,4-phenylene, Z^1 , Z^2 and Z^3 each is not a single bond.

2. (original) A compound as claimed in claim 1, in which R^5 in formula (1) is hydrogen.

3. (original) A compound as claimed in claim 2, in which R^2 and R^3 in formula (1) in claim 1 are hydrogen.

4. (original) A compound as claimed in claim 3, in which A^1 , A^2 , A^3 and A^4 in formula (1) in claim 1 are independently any of 1,4-cyclohexylene or 1,4-phenylene, and any hydrogen in these rings may be substituted with halogen.

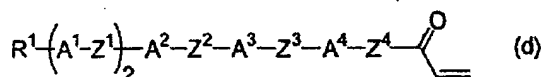
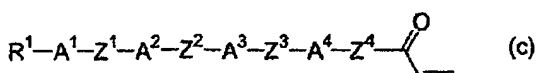
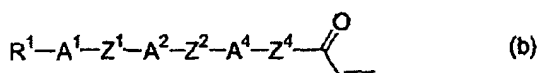
5. (currently amended) A compound as claimed in claim 3, in which A^1 , A^2 , A^3 and A^4 in formula (1) in claim 1 are independently any of 1,4-cyclohexylene or 1,4-phenylene, and any hydrogen in these rings may be substituted with halogen; and Z^1 , Z^2 and Z^3 are independently any of a single bond, $-(\text{CH}_2)_a-$, $-\text{O}(\text{CH}_2)_a-$, $-(\text{CH}_2)_a\text{O}-$, $-\text{O}(\text{CH}_2)_a\text{O}-$, $-\text{CH}=\text{CH}-$, $-\text{C}\equiv\text{C}-$, $-\text{COO}-$, or $-\text{OCO}-$, ~~$-\text{OCF}_2-$, or $-\text{CF}_2\text{O}-$~~ .

Application No.: 10/664,671

Docket No.: JCLA12230

6. (original) A compound as claimed in claim 5, in which Z^4 in formula (1) in claim 1 is a single bond.

7. (currently amended) Any one compound of formulae (a) to (d):



wherein R^1 represents ~~hydrogen~~, halogen, $-\text{CN}$, $-\text{CF}_3$, $-\text{CF}_2\text{H}$, $-\text{CFH}_2$, $-\text{OCF}_3$, $-\text{OCF}_2\text{H}$, $-\text{N}=\text{C}=\text{O}$, $-\text{N}=\text{C}=\text{S}$, or alkyl having from 1 to 20 carbon atoms, and any $-\text{CH}_2-$ of the alkyl may be substituted with $-\text{O}-$, $-\text{S}-$, $-\text{CO}-$, $-\text{COO}-$, $-\text{OCO}-$, $-\text{CH}=\text{CH}-$, $-\text{CF}=\text{CF}-$ or $-\text{C}\equiv\text{C}-$, and any hydrogen thereof may be substituted with halogen or $-\text{CN}$; A^1 , A^2 , A^3 and A^4 each independently represent 1,4-cyclohexylene, 1,4-cyclohexenylene, 1,4-phenylene, naphthalene-2,6-diyl, tetrahydronaphthalene-2,6-diyl, fluorene-2,7-diyl, bicyclo[2.2.2]octane-1,4-diyl or bicyclo[3.1.0]hexane-3,6-diyl, and in these rings, any $-\text{CH}_2-$ may be substituted with $-\text{O}-$, and any $-\text{CH}=\text{CH}-$ may be substituted with $-\text{N}=\text{N}-$, and in these rings, any hydrogen may be substituted with halogen or alkyl having from 1 to 5 carbon atoms; Z^1 , Z^2 and Z^3 each independently represent a single bond, $-(\text{CH}_2)_a-$, $-\text{O}(\text{CH}_2)_a-$, $-(\text{CH}_2)_a\text{O}-$, $-\text{O}(\text{CH}_2)_a\text{O}-$, $-\text{CH}=\text{CH}-$, $-\text{C}\equiv\text{C}-$, $-\text{COO}-$, $-\text{OCO}-$, $-(\text{CF}_2)_2-$, $-\text{C}\equiv\text{C}-\text{COO}-$, $-\text{OCO}-\text{C}\equiv\text{C}-$, $-\text{CH}=\text{CH}-(\text{CH}_2)_2-$, $-(\text{CH}_2)_2-\text{CH}=\text{CH}-$, $-\text{CF}=\text{CF}-$,

Application No.: 10/664,671

Docket No.: JCLA12230

$-\text{C}\equiv\text{C}-\text{HC}=\text{CH}-$, or $-\text{CH}=\text{CH}-\text{C}\equiv\text{C}-$, ~~$-\text{OCF}_2-$ or $-\text{CF}_2\text{O}-$~~ , and a indicates an integer of from 1 to 20; Z^4 represents a single bond or α,ω -alkylene having from 1 to 4 carbon atoms, and when Z^4 represents α,ω -alkylene having 3 or 4 carbon atoms, the $-\text{CH}_2-$ thereof directly bonded with A^4 may be substituted with $-\text{O}-$, $-\text{S}-$, $-\text{COO}-$ or $-\text{OCO}-$, and

wherein in formula (a),

any $-\text{CH}_2-$ of the alkyl represented by R^1 is not substituted with $-\text{CO}-$;

Z^4 is a single bond; and

Z^1 is not a single bond when A^4 represents 1,4-phenylene.

8. (currently amended) A compound as claimed in claim 7, in which R^1 in formulae (a) to (d) is ~~hydrogen~~, halogen, $-\text{CN}$, $-\text{CF}_3$, $-\text{CF}_2\text{H}$, $-\text{CFH}_2$, $-\text{OCF}_3$, $-\text{OCF}_2\text{H}$, alkyl having from 1 to 10 carbon atoms, alkoxy having from 1 to 10 carbon atoms, alkoxyalkyl having from 2 to 10 carbon atoms, or alkenyl having from 2 to 10 carbon atoms; A^1 , A^2 , A^3 and A^4 are independently any of 1,4-cyclohexylene or 1,4-phenylene, and in these rings, any hydrogen may be substituted with halogen; Z^1 , Z^2 and Z^3 are independently any of a single bond, $-(\text{CH}_2)_2-$, $-(\text{CH}_2)_4-$, $-\text{OCH}_2-$, $-\text{O}(\text{CH}_2)_3-$, $-\text{CH}_2\text{O}-$, $-(\text{CH}_2)_3\text{O}-$, $-\text{O}(\text{CH}_2)_2\text{O}-$, $-\text{CH}=\text{CH}-$, $-\text{C}\equiv\text{C}-$, $-\text{COO}-$, $-\text{OCO}-$, $-(\text{CF}_2)_2-$, or $-\text{CF}=\text{CF}-$, ~~$-\text{OCF}_2-$ or $-\text{CF}_2\text{O}-$~~ ; Z^4 is a single bond.

9. (previously presented) A liquid-crystal composition containing at least two polymerizable compounds, in which at least one polymerizable compound is the compound of claim 1.

Application No.: 10/664,671

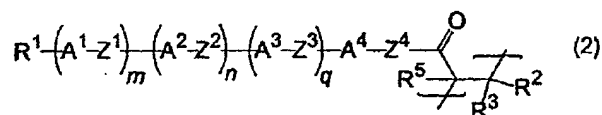
Docket No.: JCLA12230

10. (previously presented) A liquid-crystal composition, which contains at least two polymerizable compounds in which all the polymerizable compounds are the compounds of claim 1.

11. (previously presented) A liquid-crystal composition, which contains at least two polymerizable compounds that comprise at least one compound of claim 1 and at least one polymerizable compound except the compound.

12. (original) A liquid-crystal composition as claimed in claim 9, which additionally contains an optically-active compound.

13. (previously presented) A polymer having a constitutional unit of formula (2):



wherein R^1 represents hydrogen, halogen, $-\text{CN}$, $-\text{CF}_3$, $-\text{CF}_2\text{H}$, $-\text{CFH}_2$, $-\text{OCF}_3$, $-\text{OCF}_2\text{H}$, $-\text{N}=\text{C}=\text{O}$, $-\text{N}=\text{C}=\text{S}$, or alkyl having from 1 to 20 carbon atoms, and any $-\text{CH}_2-$ of the alkyl may be substituted with $-\text{O}-$, $-\text{S}-$, $-\text{CO}-$, $-\text{COO}-$, $-\text{OCO}-$, $-\text{CH}=\text{CH}-$, $-\text{CF}=\text{CF}-$ or $-\text{C}\equiv\text{C}-$, and any hydrogen thereof may be substituted with halogen or $-\text{CN}$; R^2 , R^3 and R^5 each independently represent hydrogen or an alkyl having from 1 to 3 carbon atoms; A^1 , A^2 , A^3 and A^4 each independently represent 1,4-cyclohexylene, 1,4-cyclohexenylene, 1,4-phenylene, naphthalene-2,6-diyl, tetrahydronaphthalene-2,6-diyl, fluorene-2,7-diyl, bicyclo[2.2.2]octane-1,4-diyl or bicyclo[3.1.0]hexane-3,6-diyl, and in these rings, any

Application No.: 10/664,671

Docket No.: JCLA12230

$-\text{CH}_2-$ may be substituted with $-\text{O}-$, and any $-\text{CH}=\text{}$ may be substituted with $-\text{N}=\text{}$, and in these rings, any hydrogen may be substituted with halogen or alkyl having from 1 to 5 carbon atoms; Z^1 , Z^2 and Z^3 each independently represent a single bond, $-(\text{CH}_2)_a-$, $-\text{O}(\text{CH}_2)_a-$, $-(\text{CH}_2)_a\text{O}-$, $-\text{O}(\text{CH}_2)_a\text{O}-$, $-\text{CH}=\text{CH}-$, $-\text{C}\equiv\text{C}-$, $-\text{COO}-$, $-\text{OCO}-$, $-(\text{CF}_2)_2-$, $-\text{C}\equiv\text{C}-\text{COO}-$, $-\text{OCO}-\text{C}\equiv\text{C}-$, $-\text{CH}=\text{CH}-(\text{CH}_2)_2-$, $-(\text{CH}_2)_2-\text{CH}=\text{CH}-$, $-\text{CF}=\text{CF}-$, $-\text{C}\equiv\text{C}-\text{HC}=\text{CH}-$, $-\text{CH}=\text{CH}-\text{C}\equiv\text{C}-$, $-\text{OCF}_2-$, or $-\text{CF}_2\text{O}-$, and a indicates an integer of from 1 to 20; Z^4 represents a single bond or α,ω -alkylene having from 1 to 4 carbon atoms, and any $-\text{CH}_2-$ of the alkylene may be substituted with $-\text{O}-$, $-\text{S}-$, $-\text{COO}-$ or $-\text{OCO}-$; and m , n and q each independently indicate 0, 1 or 2; and wherein when $m+n+q=1$, any $-\text{CH}_2-$ of the alkyl represented by R^1 is not substituted with $-\text{CO}-$ and Z^4 is a single bond.

14. (original) A polymer as claimed in claim 13, in which R^5 in formula (2) is hydrogen.

15. (original) A polymer as claimed in claim 13, in which R^2 , R^3 and R^5 are hydrogen.

16. (original) A polymer as claimed in claim 13, in which R^2 , R^3 and R^5 are hydrogen; A^1 , A^2 , A^3 and A^4 are independently any of 1,4-cyclohexylene or 1,4-phenylene, and any hydrogen in these rings may be substituted with halogen.

17. (original) A polymer as claimed in claim 13, in which R^2 , R^3 and R^5 are hydrogen; A^1 , A^2 , A^3 and A^4 are independently any of 1,4-cyclohexylene or 1,4-phenylene, and any hydrogen in

Application No.: 10/664,671

Docket No.: JCLA12230

these rings may be substituted with halogen; and Z^1 , Z^2 and Z^3 are independently any of a single bond, $-(CH_2)_a-$, $-O(CH_2)_a-$, $-(CH_2)_aO-$, $-O(CH_2)_aO-$, $-CH=CH-$, $-C\equiv C-$, $-COO-$, $-OCO-$, $-OCF_2-$, or $-CF_2O-$.

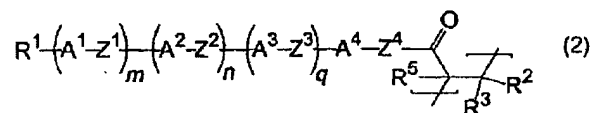
18. (original) A polymer as claimed in claim 13, in which R^2 , R^3 and R^5 are hydrogen; A^1 , A^2 , A^3 and A^4 are independently any of 1,4-cyclohexylene or 1,4-phenylene, and any hydrogen in these rings may be substituted with halogen; Z^1 , Z^2 and Z^3 are independently any of a single bond, $-(CH_2)_a-$, $-O(CH_2)_a-$, $-(CH_2)_aO-$, $-O(CH_2)_aO-$, $-CH=CH-$, $-C\equiv C-$, $-COO-$, $-OCO-$, $-OCF_2-$, or $-CF_2O-$, and Z^4 is a single bond.

19. (original) A polymer as claimed in claim 13, in which R^1 in formula (2) is hydrogen, halogen, $-CN$, $-CF_3$, $-CF_2H$, $-CFH_2$, $-OCF_3$, $-OCF_2H$, alkyl having from 1 to 10 carbon atoms, alkoxy having from 1 to 10 carbon atoms, alkoxyalkyl having from 2 to 10 carbon atoms, or alkenyl having from 2 to 10 carbon atoms; R^2 , R^3 and R^5 are hydrogen; A^1 , A^2 , A^3 and A^4 are independently any of 1,4-cyclohexylene or 1,4-phenylene, and in these rings, any hydrogen may be substituted with halogen; Z^1 , Z^2 and Z^3 are independently any of a single bond, $-(CH_2)_2-$, $-(CH_2)_4-$, $-OCH_2-$, $-O(CH_2)_3-$, $-CH_2O-$, $-(CH_2)_3O-$, $-O(CH_2)_2O-$, $-CH=CH-$, $-C\equiv C-$, $-COO-$, $-OCO-$, $-(CF_2)_2-$, $-CF=CF-$, $-OCF_2-$ or $-CF_2O-$; Z^4 is a single bond.

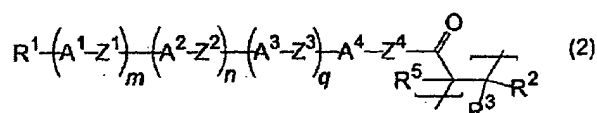
20. (previously presented) A polymer that is obtained through homopolymerization of one compound of claim 1 and has a constitutional unit of formula (2):

Application No.: 10/664,671

Docket No.: JCLA12230



21. (previously presented) A polymer that is obtained from the liquid-crystal composition of claim 9 and has a constitutional unit of formula (2):



22. (previously presented) An optically-anisotropic material of the polymer of claim 13.

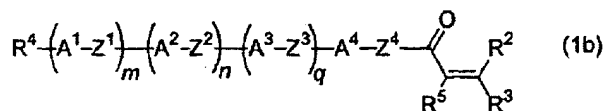
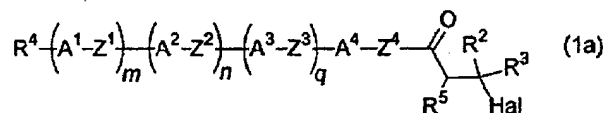
23. (previously presented) A liquid-crystal display device, which contains the polymer of claim 13.

24. (original) A liquid-crystal display device, which contains the optically-anisotropic material of claim 22.

25. (original) A method for producing a vinyl ketone compound of formula (1b), which comprises reacting one molar equivalent of a compound of formula (1a) with from 1 to 10 molar equivalents of a Lewis acid at -70°C to 200°C, followed by dehydrohalogenating the resulting compound:

Application No.: 10/664,671

Docket No.: JCLA12230



wherein R^4 represents hydrogen, halogen, $-\text{OH}$, $-\text{CN}$, $-\text{CF}_3$, $-\text{CF}_2\text{H}$, $-\text{CFH}_2$, $-\text{OCF}_3$, $-\text{OCF}_2\text{H}$, $-\text{N}=\text{C}=\text{O}$, $-\text{N}=\text{C}=\text{S}$, or alkyl having from 1 to 20 carbon atoms, and any $-\text{CH}_2-$ of the alkyl may be substituted with $-\text{O}-$, $-\text{S}-$, $-\text{CO}-$, $-\text{COO}-$, $-\text{OCO}-$, $-\text{CH}=\text{CH}-$, $-\text{CF}=\text{CF}-$ or $-\text{C}\equiv\text{C}-$, and any hydrogen thereof may be substituted with halogen or $-\text{CN}$; R^2 , R^3 and R^5 each independently represent hydrogen or an alkyl having from 1 to 3 carbon atoms; A^1 , A^2 , A^3 and A^4 each independently represent 1,4-cyclohexylene, 1,4-cyclohexenylene, 1,4-phenylene, naphthalene-2,6-diyl, tetrahydronaphthalene-2,6-diyl, fluorene-2,7-diyl, bicyclo[2.2.2]octane-1,4-diyl or bicyclo[3.1.0]hexane-3,6-diyl, and in these rings, any $-\text{CH}_2-$ may be substituted with $-\text{O}-$, and any $-\text{CH}=\text{CH}-$ may be substituted with $-\text{N}=\text{N}-$, and in these rings, any hydrogen may be substituted with halogen or alkyl having from 1 to 5 carbon atoms; Z^1 , Z^2 and Z^3 each independently represent a single bond, $-(\text{CH}_2)_a-$, $-\text{O}(\text{CH}_2)_a-$, $-(\text{CH}_2)_a\text{O}-$, $-\text{O}(\text{CH}_2)_a\text{O}-$, $-\text{CH}=\text{CH}-$, $-\text{C}\equiv\text{C}-$, $-\text{COO}-$, $-\text{OCO}-$, $-(\text{CF}_2)_2-$, $-\text{C}\equiv\text{C}-\text{COO}-$, $-\text{OCO}-\text{C}\equiv\text{C}-$, $-\text{CH}=\text{CH}-(\text{CH}_2)_2-$, $-(\text{CH}_2)_2-\text{CH}=\text{CH}-$, $-\text{CF}=\text{CF}-$, $-\text{C}\equiv\text{C}-\text{HC}=\text{CH}-$, $-\text{CH}=\text{CH}-\text{C}\equiv\text{C}-$, $-\text{OCF}_2-$ or $-\text{CF}_2\text{O}-$, and a indicates an integer of from 1 to 20; Z^4 represents a single bond or α,ω -alkylene having from 1 to 4 carbon atoms, and any $-\text{CH}_2-$ of the alkylene may be substituted with $-\text{O}-$, $-\text{S}-$, $-\text{COO}-$ or $-\text{OCO}-$; m , n and q each independently indicate 0, 1 or 2; Hal represents chlorine, bromine or iodine.

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.